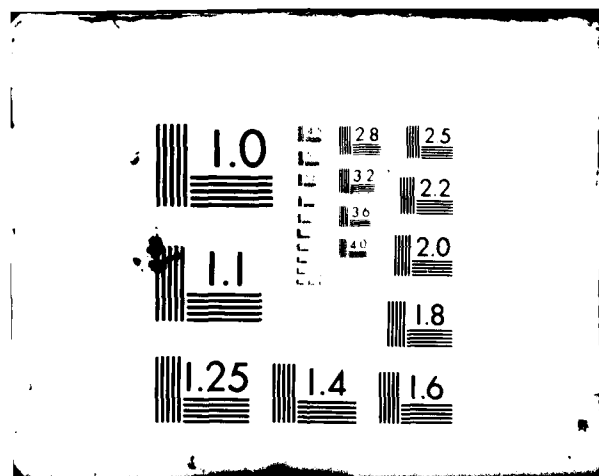AD-A110 065   GEORGIA INST OF TECH ATLANTA SCHOOL OF INFORMATION A--ETC F/G 5/1
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THE ARMY INSTITUTE FOR RESEARCH IN MANAGEMENT
INFORMATION & COMPUTER SYSTEMS (ARIMCS)

Contract No. DAAK 70-78-...
Task Order No. 6

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AUTOMATING THE EXCHANGE OF MILITARY PERSONNEL

DATA AMONG SELECTED ARMY ORGANIZATIONS

FINAL REPORT

VOLUME I

Presented to the Army Institute for Research in Management

Information & Computer Systems (AIRMICS)

Contract No. DAAK 70-79-0087

Task Order No. 6

Research Project No. G36-647

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GEORGIA INSTITUTE OF TECHNOLOGY

June 30, 1981

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DISCLAIMER

The findings in this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

FINAL REPORT June 30, 1981

TABLE OF CONTENTS

VOLUME I

PREFACE

This report is the product of a research effort conducted by the School of Information and Computer Science, Georgia Institute of Technology, on behalf of the Army Institute for Research in Management Information and Computer Systems (AIRMICS). The purpose of the effort has been to develop and offer an independent, outside review of the key concerns to which the Army should address itself in upgrading its Automated Manpower and Personnel Resources Management Information Systems. The basic intent was to identify and examine specific critical issues which must be satisfactorily resolved if the Army is to have, in the decade of the 80's and beyond, automated systems which effectively incorporate present and emerging systems technology in meeting Department of the Army objectives.

Since the future is a function of the past and of the present, AIRMICS administrators understood the desirability of having the research conducted with some relation to the hardware, software, and other realities of the existing information systems currently found within various segments of the Army personnel community. As a result, arrangements were made to allow the researchers to use, as a setting and context for their activities, the major organizations involved in Army personnel management—in particular, the US Army Military Personnel Center (MILPERCEN) in Alexander, Va., as well as various major Army and DOD activities which seemed to have especially high needs for personnel-related information. The latter entities include such organizations as the US Army Finance and Accounting Center (USAFAC), the Deputy Chief of Staff for Personnel (DCSPERS), the US Army Management Systems Support Agency (USAMSSA), the Reserve Component Personnel and Administration Center (RCPAC), and others.

The researchers would therefore like to thank not only AIRMICS (for its sponsorship of the effort and for its far-sighted, large-picture view of System Development activities relative to major personnel and human-resource systems); but also the various activities that have allowed their organizations to be used as instruments through which the researchers could be generally oriented to the extremely complex, important, and unique characteristics of military personnel management. The persons from these organizations who have helped with their time, enthusiasm, and knowledge are too numerous to name. However, for the special importance of his hospitality to the success of this project, we would like to single out Brig. General W. Barnes, Director of the PER-SINSD Directorate of MILPERCEN.

The report is divided into two volumes. Volume I is divided into the following 6 sections:

Section 1 outlines the background of the project, and discusses the conceptual difficulties inherent in scoping out a problem so massive in relation to the project resources and time available.

Section 2 delineates a number of data base management concepts

which the researchers believe to represent a reasonable view of how the Army wishes to proceed in the development of plans for new information systems to meet future manpower management needs.

Section 3 reviews the findings that the researchers have made during the course of their orientation visits to the various organizations enumerated previously, and identifies what seem to be the major obstacles that the Army will face as it attempts to make the transition from the present to the future.

Section 4 summarizes the researchers' assessment of the overall management information systems problem as it now exists and discusses the issues which must be resolved before the Army can successfully proceed to upgrade its current personnel data systems.

Section 5 summarizes the work done at the Army Human Resources Management Information Systems Workshop held in Atlanta, Georgia October 6-8, 1980.

Section 6 sets forth the conclusions of the research, identifies generic issues, outlines research areas for providing decision support data, and offers recommendations by the team based on the research and study performed.

Volume II contains a set of appendices containing data collected during the course of the study. A complete listing and description of those appendices is contained at the beginning of Volume II.

SECTION I.

PROJECT BACKGROUND AND OBJECTIVES

The Army Institute for Research in Management Information and Computer Systems (AIRMICS) is the research arm of the U. S. Army Computer Systems Command. As a research group, AIRMICS has a continuing and long-term interest in the development and demonstration of tools, techniques, procedures, and advanced design concepts applicable to future management information systems. This project falls within the general scope of that aspect of the AIRMICS mission. Specifically, the need for improved interface capabilitites within the Army personnel community presented AIRMICS with a problem whose solution had long term implications for improved database design throughout Army computer systems and concomitantly the possibility for developing recommendations that might provide some near term relief from problems affecting management procedures. This latter outcome was not a primary reason for undertaking the research, but it was considered a distinct and desirable by-product of the study. The AIRMICS group was first made aware of the need for a critical review of the interface among Army personnel databases by communication from General John S. Crosby, who was at that time the Director of Personnel Information Systems (PERSIND) at the Military Personnel Center. General Crosby was concerned with the current systems dependence on off-line data transfer for the purpose of data management and strength reconciliation. It was General Crosby's wish that research be undertaken to determine the feasibility of introducing state-of-the-art database design concepts into the Army personnel community with the expectation that all major personnel components might be served by a common database. Creating a common database capability was seen as the ultimate answer to the problem of eliminating the need for extensive off-line transfer of data and the numerous work tapes currently required for preparing standard and special manpower reports. AIRMICS was happy to comply with General Crosby's request for a study of the problem of data exchange within the Army personnel community. As noted above, it dovetailed well with their own basic mission and promised a work product that had potential for improving the management of personnel data throughout the Army by obtaining insights into the dynamics and economics of very large file management.

Before the present project could be started General Crosby was replaced by General Barnes as Director of PERSIND. General Barnes expressed a similar interest in the research effort and felt that the Army's current concern with mobilization made the study even more timely and significant. The current information systems for managing Army personnel data tend to be geared towards peacetime operations. Mobilization planning has heightened the Army's interest in its capacity for adjusting its manpower management systems from a peacetime to a wartime footing with minimum delay and systems retooling. With respect to the present study, mobilization has had the effect of alerting the AIRMICS study group to the importance of keeping in mind that a military

database needs to have design features that allow for the rapid expansion of the number of personnel it can handle and the specific set of data elements to be maintained for those personnel. The database should also be amenable to adjusting smoothly to a variety of procedures for creating and updating records. In addition to the recognized need for handling massive amounts of data to accomplish fairly complex transactions and reports, Army personnel systems need to be flexible and dynamic in their database structures.

Once this research study began, it became immediately evident that there were a number of other studies being conducted within the Army personnel community that had direct implications for this effort. Three of these deserve special mention. First, there was the Master Automation Plan for Military Personnel Systems (MILMAP) study being conducted by the Automatec nagement Office (AMO) attached to the office of the Commanding General at MILPERCEN. This study is exhaustively documenting the data flow involved in managing the soldier throughout the life cycle of his military career. Work completed to date covers the accessioning and training of Army personnel. Still underway is the study of the personnel functions of sustenance, distribution and separation. Second, MILPERCEN's Personnel Management Systems Directorate is completing a two year effort to identify the true universe of data that the Army finds desirable to maintain in automated mode. The focus of this study group has been on the elimination of redundancy and duplication in the Army personnel system (ERAD). Third, there are the Standardization conferences being conducted under the aegis of PERSINSD in an attempt to reinvigorate the personnel community's commitment to employing only standard data elements and codes in their automated systems. In different ways each of these concomitant study efforts were seen to have important implications for this study.

As a result of arrangements made by the Data Management Division of PERSINSD, staff on this project were able to be briefed on MILPERCEN's mission and operations. PERSINSD provided the point of contact for helping project staff in their efforts to gain access to personnel and activities relevant to the information needs of this study. Meetings and site visits within MILPERCEN and at other Army commands were arranged as required. These contacts and the documents listed in the Appendix provided the primary sources of information used in conducting Phase One of the study.

The researchers employed in the conduct of the study comprised a team fielded by the School of Information and Computer Science of the Georgia Institute of Technology (GIT). AIRMICS is physically located in the School of Information and Computer Science (ICS) on the GIT campus. This physical proximity permits AIRMICS and ICS to enjoy a close working relationship which exploits the strengths of both organizations.

STUDY OBJECTIVES

The mandate for this study was broad and general. In brief, AIRMICS was elected to conduct research into the feasibility of establishing data processing procedures that would support the automated exchange of common personnel data among selected Army organizations. As

originally scoped out by General Crosby, the study was to conduct
exploratory research into alternatives for improved data resource
sharing. In particular, the objective was to eliminate undesirable off-
line data interfaces and to delineate the technology required for real-
time, on-line data exchange throughout the Army personnel community.

In confronting this challenge, AIRMICS proposed a two phase study
effort that would first assess the nature of the interface problem and
then recommend alternative technologies for dealing with it. Phase One
of the project had the objective of critically reviewing the current
personnel data management systems in place at MILPERCEN and at other
selected Army organizations that had major interfaces with MILPERCEN.
Specifically, the research team proposed examining the commonalities in
the personnel data being exchanged in a framework that would show the
general flow of data through the various Army systems and sub-systems
used for its management.

Phase One research activities culminated in an interim report to
provide the Army with an independent view of the automated interface
requirements of its Manpower and Personnel Data Management Systems.
This report set the stage for the Phase Two activities of the project.
Phase Two activities were mainly analytical and consultative; their
purpose was to identify and describe defensible system modifications
that the Army should consider implementing in attaining its goal of
improved personnel data exchange. During Phase Two, project staff
capabilities were amplified by the use of consultants from business,
government, and academia. Using the Phase One report as their point of
departure, these consultants were asked to supply regular project staff
with the benefit of their thinking on how the Army can best automate its
personnel data interfaces.

This final report for the project is a synthesis of staff recommen-
dations for developing a comprehensive framework for planning a tech-
nologically realistic and appropriate approach for accomplishing the
needed integration of the Army's overall personnel management informa-
tion system.

SECTION II.

DATABASE MANAGEMENT GOALS FOR ARMY PERSONNEL SYSTEMS

By their very nature, military personnel sysems must be large and complex. Automating such systems represents a technological challenge of the highest order. In the case of the peacetime United States Army, for example, an automated personnel system must be capable of storing detailed records on upwards of three quarters of a million persons on which hundreds of thousands of transactions per month must be performed. In a mobilization environment, these numbers will be expanded by a factor of 3 or more. Because Army personnel are highly transient, in terms of accessions, transfers and separation, the personnel management system must also be highly responsive to manpower planning and information requests in order to ensure compliance with levels of strength authorized and budgeted by the legislature.

The mere creation and maintenance of a database of these dimensions is a monumental task which offers a vigorous challenge to state-of-the-art technology. Yet modern management needs place even further demands on the system: the system must be able to manage individual servicemen's careers; to provide commanders at many levels with timely and reliable manpower reports; to supply planners and analysts with data for modeling and other sophisticated analyses of staffing, training, and fiscal requirements.

The purpose of this section of the report is to describe the structure and function of the Army personnel systems in terms of the "ideal" systems technology needed to support those systems. (The technology to be considered is "ideal", not in the sense that it does not yet exist, but in the sense that it is not yet universally in place within the Army personnel community.) Sources of information for this section were interviews held with various Army data managers and end-users, along with the analysis of a number of documents and papers supplied to the researchers by Army personnel and national information services. Database considerations presented herein realistically reflect currently perceived goals of the Army personnel system to the extent that these sources can convey them in a time of international turmoil.

This section of the report therefore presents a view of the Army's own objectives for its Manpower and Personnel Data Management Information Systems. In the opinion of the research team, that is the appropriate framework for considering the automated data interfaces which are the direct object of study in the project. It is seen as the proper basis for considering the value and need of any specific proposed interface. It elevates the entire study effort above the level of considering and proposing interface procedures that are little more than patches on the current operating systems. (The Army has sufficient capable personnel to accomplish such objectives without the need of outside consultants.) The purpose of this study clearly indicated a desire for a more radical approach to the interface problem, one which

would touch directly on the design factors which would resolve the interface problem not as it exists today but as it will exist in the future technology ... a technology which the Army has no real option but to embrace. Clearly, this means that one outcome of this study must be to provide current data managers with additional support in their quest for hardware, software, and organizational modernization to achieve a computer communications environment commensurate with the responsibilities they bear.

The Army personnel community is characterized by a necessary diversity in personnel system requirements, levels of management and geographic locations. Partly because of command philosophy and partly due to practical necessity, a certain measure of decentralization has come to pervade the systems by which the Army personnel resources are managed. At the same time, the need for an appropriate degree of centralization has come to be recognized as essential for the efficient management of manpower resources. The specific form centralization should take and the manner in which it should be implemented should remain a matter of continuing discussion throughout the Army. Automated personnel systems are acknowledged to have the potential for increasing centralized control and management of personnel resources. The transformation of MILPERCEN from a basically archival activity into the vital personnel center it has become over the years gives tacit evidence of the trend towards centralization which automation has bought to the military personnel community.

While there is some question as to the degree to which the Army, in its MILPERCEN operations, has successfully centralized its manpower and personnel data support systems, a legitimate issue can be raised concerning the wisdom and practicality of pursuing centralization to the point where the processing of personnel data is totally monolithic. The very immensity of this task from a data processing point of view, if from none other, makes it a questionable goal. Currently, there are critics who claim that the present system is already over-centralized to the point where it will simply not operate in a wartime environment. No comment is necessary on the seriousness of this claim for a major military arm of the Defense Department. Even if one puts the best construction possible on the effectiveness of the present personnel system, the existence of the SIDPERS-Wartime study group stands as witness to the fact that MILPERCEN can go on a wartime footing only by drastically reducing the personnel data items handled. The problem of how successfully it can convert its systems to operate in the SIDPERS wartime mode is being studied and tested with field trials.

Whatever one's position on the desirability of taking system centralization to its logical extreme, there seems little doubt that the Army personnel system must be an integrated and coordinated system. At the moment this remains a distant goal of the Army personnel system. While many headquarters manpower functions have been consolidated, the Army still lacks that degree of commonality in its data bases which will allow it to tie manpower management activities at low levels into the budget process at DA level. A recent GAO study confirms this deficiency in the Army personnel system and has recommended that the Army move promptly "to integrate manpower management activities at all levels."

No one in the Army denies the imperfections in their manpower and personnel management systems. What seems to be lacking is the willingness to charge a single organizational unit with the responsibility for managing all manpower information functions. Under the current system there are many examples of praiseworthy efforts on the part of individual commands to facilitate manpower and personnel interfaces among different organizations. The GAO report, however, is critical of this piecemeal approach to resolving manpower utilization and accounting within the Army. Instead, the GAO firmly, almost stringently, recommends that the Army move promptly to establish the common data base which alone will enable the Army to interrelate all aspects of the manpower management process (civilian and military). Without such an integrated system, the Army will continue to be unable to aggregate manpower needs according to budget categories, directly relate manpower to workload, trace budget changes to the detail level, and evaluate manpower utilization. Finally, according to the GAO report, an integrated personnel data system will give the Army a "defined structure for setting goals, acquiring needed information, and establishing accountability to compare performance with goals."

The GAO report clearly indicates that there may be political obstacles hindering the development of an integrated manpower and personnel system within the Army. (While such concerns are outside the scope of this project, they have been mentioned because they impact on any timetable that might be prepared for consolidating current Army personnel databases into an integrated system). Political considerations, however, need not impact negatively on efforts to conceptualize the steps which would have to be taken if the decision were made to develop an integrated system. Nor should political considerations have much relevance for discussion and research into the best design factors to incorporate into such a system. Indeed, a systems engineering program to research those issues might prove to be an effective mechanism for encouraging the Army to resolve any political or organizational problems currently standing in the way of making such a system operational. In that vein, it was the opinion of this research team that attention should be focused on the computer/communications needs (hardware and software) that will have to be met if the Army is to integrate its personnel databases. Developing plans and procedures for improving its systems technology can only be expected to impact favorably on any negative organizational structures presently recognized as impeding technological progress.

This approach also has the virtue of responding to the expressed needs of middle management throughout the various organizations currently charged with managing Army personnel data. Most of them are quite conversant with the latest technology and are eager to incorporate its products into their operational systems. If one were to ask why they are not now making more headway in integrating operations, one would have to remember that they do not now have the mass storage capability for economically and successfully managing very large on-line data bases. Until they have the tools to establish and maintain an integrated system, with data distributed in a centrally controlled manner rather than the current decentralized manner, it is unfair to be

critical of their reliance on off-line interfaces and uncoordinated processing cycles with the resultant inconsistency among databases. There is really no other way for them to operate.

In that regard, the research team was most favorably impressed with the degree of foresight into future ADP systems design manifested by the present managers of the Army personnel databases. In previous places of this report, mention has been made of the number of planning studies currently underway. These studies have direct bearing on the task of bringing improved integration into the systems used to manage manpower and personnel data. They show a definite sensitivity to the needs of end-users of the data and a willingness to make the systems carry out the varied and demanding procedures the systems have been tasked to perform. Where there is dissatisfaction with the systems, that disappointment is shared by the data managers. In most instances, the root of the difficulties with the present systems can be traced to the necessity of working with outmoded hardware and the software limitations imposed by that hardware. (Other reports, such as those developed by President Carter's Reorganization Project for Federal Data Processing, have dealt in depth with the jungle of regulations imposed on the acquisition process. This jungle is the principal cause of obsolescent and archaic systems such as those operated by MILPERCEN.)

In sum, there is much interest in what state-of-the-art technology would do for managing Army manpower and personnel data. They are planning for a future which includes mainframe computers with large capacity mass storage; micro and minicomputer capabilities to assist with data capture and local automated preprocessing of data input; redesign of database management systems (initially for query and reporting, but ultimately for updates and communication with other systems); increased use of microfiche storage of historical records (automatically retrievable); wide use of word processing, screen input and output of data records, and graphics at the end-user level; and software that is table-driven and independent of specific hardware.

The standard goals and objectives for operating an integrated database management system are well-known and readily available from many information sources. The bibliography attached to this report provides many references to the literature on DBMS. For the purpose of this research what is needed is a brief statement of the Army Personnel Management goals to be accomplished by a wider application of DBMS technology. It should be understood, of course, that the basic goals and objectives of the Military Personnel Data Management function remain the same whether DBMS or any other technology is employed to support that function. What changes with the technology is mostly the manner in which the functions are implemented. Computer technology mainly changes processes from a manual operational state to an automated state with attendant security and data integrity benefits.

In large measure, current Army personnel functions have already been converted to automated procedures. The promise of DBMS is to continue the trend to fuller automation, with an emphasis on upgraded database structures and the automated exchange of data between geographically separated sites. In general, changes in these directions

imply a commitment to the acquisition of the hardware which will support the on-line storage of massive amounts of data (estimated from 12 to 18 billion characters for current peacetime requirements) and the communications equipment necessary to support highly active update procedures as well as the sharing of large segments of the master database.

A sometimes less obvious, but perhaps even more critical, commitment must also be made to the development of the sophisticated software required for operating a complex network of data processing sites. Commercially available software may be used for this purpose, but these packages must often be tailored to individual applications at some cost to the using organizations. As noted previously, consideration must also be given to management changes that will inevitably be required to establish the kind of centralized control needed for operating DBMS networks. Without such centralized control, it is unlikely that the Army personnel management process will ever satisfactorily achieve the ability to amalgamate mission needs, career needs of individuals, and total force needs.

As noted earlier, there is nothing offical about the following statement of the database management goals for the Army's personnel systems. The statement represents the research teams's summary of information from many sources. The intent is not to lay down a blueprint for the future, but to introduce for discussion the various issues which must be legitimately considered if DBMS procedures are to be introduced into the Army's management and personnel data systems. Hereinafter the system whose goals are being stated here will be referred to as APDBMS, meaning the Army Personnel Database Management System.

A. General System Characteristics.

* The APDBMS should be designed to operate in a total force management environment tailored to satisfy both peacetime and wartime requirements.

* The APDBMS should support all Army personnel data management requirements and function with a high level of integration and commonality in its data base structure and its system operations procedures.

* The APDBMS should be modular, allowing for the addition or deletion of equipment or systems software without major redesign or degradation of processing capabilities.

*The APDBMS should facilitate editing data at its source, storing data where it is to be used, thereby providing end-users with controlled query and update capabilities.

* The APDBMS should have network capabilities allowing it to have an automated interface with other major data systems, such as JUMPS.

* The APDBMS should be centrally managed so that it will operate under enforceable standards that will prevent the distribution of data stores and/or functions to degenerate into unmanageable congeries of ad hoc and individualistic procedures within separate commands.

* The APDBMS should minimize data redundancy and eliminate any necessity for special conversion routines to transfer data from one site to another.

B. Specific Life Cycle Data Management Requirements.

The Army manpower and personnel data management system has been conceptualized on a model that embodies the life cycle of a military career. The five stages of this life cycle model are accession, training, sustenance, distribution, and separation (where separation is generally a non-terminating function which includes considerations of retirement, survivors, etc.) At each stage of the life cycle the personnel data management system is required to perform certain functions that are more specific than the general requirements discussed above. Basically, as a manpower as well as a personnel data system the APDBMS should have the following two overriding management features.

1. Sub-systems for accurately allocating, controlling, and accounting for manpower requirements and resources.

2. Sub-systems with the capacity for collecting, analyzing, projecting and displaying various types of workload and productivity data.

Within each phase of the career life cycle, there are other specific sub-system requirements which the APDBMS must meet. These are described next. The functions listed under each life cycle phase are not intended to be complete and exhaustive. They are included in this report to illustrate and exemplify the complexity and extensiveness of the personnel management functions demanded of a military system.

a. Accessions.

* Provide an automated capability to recruit the most qualified individuals to satisfy current and projected requirements.

* Apply projected resources against personnel requirements to create a recruitment quota bank.

* Track accessions in a way that allows end-strength reporting according to approved budget levels and categories.

* Insure single source data capture for all gains to the master personnel database and perserve that data.

b. Training.

* Establish an integrated system for developing and communicating training requirements and quotas.

* Support a sub-system for developing optimum training schedules.

* Maintain a centralized on-line data bank of education and training requirements, programs, and resources.

c. Sustenance.

* Provide automated support for the several Army promotion systems.

* Monitor reenlistement bonus funds.

* Operate a sub-system for reporting combat zone casualty statistics.

* Insure that Guard/Reserve participation data are available for evaluation processes.

* Record award and decoration data.

* Maintain timely data relevant to leave, pay, and dependent status.

d. Distribution.

* Provide automated support to Army programs for job classification, duty, assignment, and career development.

* Maintain an automated manning and distribution system for job definition, job option offers, and job performance criteria.

* Provide an automated resource for matching individual career needs with Army staffing needs.

* Provide Army managers with on-line authorized and assigned statistical data.

e. Separation.

* Integrate the active duty separation process with with the appropriate Guard or Reserve accession process.

* Provide Army managers with information needed for decisions related to loss statistics.

* Supply Army planners and modelers with data needed in using force structure models.

* Suport the Army's capability for analyzing assigned strength in order to accurately project end strengths, training requirements, and recruiting requirements.

The goals and objectives outlined above for an Army manpower and personnel database management system clearly demonstrate the magnitude of the task involved in integrating such diverse and data rich functions. Persons familiar with database management systems will recognize the problems to be faced in designing a DBMS capable of handling the job. They will be particularly sensitive to the fact that DBMS concepts have become popular because of the ease with which classes of data can be retrieved using a DBMS. What needs to be remembered, however, is that this facility is purchased at a price at the other end of the data processing cycle; namely, that DBMS has a greater overhead in time and space for updating and maintaining the data in a system. In the case of a military system, there are also the complicating factors of size and activity as well as the need to process data both at the individual record level and at the total force level. In other words, some Army managers need complete information about the individual, while others are interested in statistical factors about the entire force. It will be difficult to design a data structure that is equally facile in serving these diverse needs simultaneously.

Of course these known needs are constantly modulated, mixed, and magnified by the winds of government change. Hence, there are further characteristics which must be envisioned for an Army personnel database management system. These are (1) security and (2) the need to provide for system change in response to policy and operational shifts. Security does not pose too difficult a problem. Most database management systems have excellent features for controlling and auditing access to data and for preventing unauthorized personnel from tampering with the database. As a military organization, the Army is already security conscious, and, unlike civilian organizations undertaking to place their personnel systems under a DBMS, the Army should have no particular problem in installing appropriate security provisions for data access.

System changes in a large bureaucratic setting such as a modern army are normally a time-consuming and intricate process. There are usually many layers of authority through which a proposed change must travel. In an integrated DBMS environment, this process is further complicated by the fact that even a relatively straightforward change may have impacts that will affect the system at many different points. Change in this data processing mode must be carefully evaluated for system impacts and provision must be made for all systems effects of a change. Fortunately, DBMS systems are so intrinsically complex that they can not be successfully operated without automated dictionary and directory tools. For this reason, change is often managed more successfully in these systems than in tape-driven, file-oriented systems where sloppy documentation can be more easily tolerated. Nonetheless, responsiveness to database changes must remain an important design consideration for an Army personnel DBMS inasmuch as system changes can be anticipated as a somewhat regular system requirement.

SECTION III.

REVIEW OF CURRENT ARMY PERSONNEL DATA SYSTEMS INTERFACES

This section of the report discusses the current status of the Army's personnel data interfaces. In general, data transfer currently takes place off-line, with files being updated in batch mode according to schedules mandated by the data needs of the various information sub-systems being supported. Insofar as possible, AUTODIN is used to transfer data across different geographical sites. There are some instances, however, where tapes are mailed or sent by courier. Within the SIDPERS system punch cards are still used as a transfer medium for some transactions.

When AIRMICS first considered the Army military personnel data information system as a suitable arena in which to research the development of DBMS concepts in the Army environment, it had been given the impression that MILPERCEN and other Army organizations handling personnel data were using some type of DBMS to support their applications programming. AIRMICS understandably viewed the interface requirement as a technical problem involving the need for linking major databases into a communications network. In addition to the lack of communications, AIRMICS anticipated that there were problems with the consistency and proponency of data elements used in the Army personnel community. As initially envisioned, these were to be the problems tackled by the study group. The solution was to take the general form of employing automated tools for data definition and systems documentation. These activities were to be followed by the design and field testing of a communications interface between MILPERCEN's master personnel database and the databases of other selected Army organizations, such as the JUMPS database, RCPAC's personnel master file of reservists, and the Base level personnel files maintained at two or three SIDPERS field installations.

Consulation with MILPERCEN staff revealed that AIRMICS was working under a set of assumptions that were in fact incorrect. The only role being played by DBMS in the Army personnel community was the use of System 2000 to support limited real-time queries to MILPERCEN's OMF/EMF master files. It was also learned that while System 2000 responds well to requests for individual records, it functions poorly for statistical and tabular inquiries. For that type of request, ODIS (Overnight Data Information System) had been developed to batch information requests which are run nightly not against the System 2000 database, but against a compressed tape version of the OMF/EMF. It was also learned that System 2000 inquiries must be processed separately aginst the OMF and EMF databases, since there is no interface linking them.

Later in the course of the study, it was learned that processing under DBMS technology was equally absent in the other concerned Army organizations. The case of RCPAC is probably typical. This organiza-

tion possesses a complete DBMS software package, including DATAMANAGER (a Data Dictionary/ Directory), TOTAL (a DBMS), and ENVIRON-1 (a Communications Control Package). At the moment, however, no integral aspect of RCPAC's personnel data processing is being carried out with these tools. The utilization of this technology must await certain equipment additions and replacements. In the meantime, a planning group has been formed to determine the systems design work that will be required prior to implementing DBMS. The present expectation of this group, however, is that DBMS will be used only for query and not for update.

Clearly, then, current data management procedures in the Army personnel data community are necessarily oriented to support a tape structured rather than a database structured information system. The design and documentation for operating the Army personnel systems dates back to the early Seventies when the current SIDPERS system was implemented. Everyone recognizes that this system was not designed for (and so cannot readily utilize) current state-of-the-art procedures for managing and sharing personnel data. Under the constraints inherent in the present system, it is also clear that a creditable job is being done in managing the information required for operating the Army's extensive and complex personnel functions. No one, morever, is more interested in upgrading present system technology than the managers of the Army personnel community themselves, and the AIRMICS interest in researching DBMS technology for use in that environment should be a welcome involvement.

In reviewing current manpower and personnel data management procedures for AIRMICS, the Georgia Tech team focused primarily on the nature of the several interfaces required in the flow of Army personnel data. DBMS technology has the potential for improving data management in each of these interface situations. In the course of this review, it was evident that a number of important related initiatives are already well underway within the Army personnel community. These include the MILMAP study, the standardization conferences, and the ERAD study. Each of these efforts are dealing with issues and problems whose resolution is fundamental to any attempt to incorporate DBMS technology in the management of Army personnel data.

A word is in order about how AIRMICS might build on each of these efforts. In the case of the MILMAP study, as has been mentioned elsewhere in this report, the objective of the AMO's (now IRM's) involved is to lay down a Master Automation Plan for future systems revision of the Army personnel information system. This group has approached that task from the aspect of the five life cycle functions comprising a military personnel system's management goals. In carrying out their mission, the MILMAP study team has delineated the major data flows and interfaces required in operating the personnel information system. The MILMAP study of the life cycle functions can provide AIRMICS with a basis for dealing with technical problems such as the following:

* Single source data entry

* Edits performed at the point of data entry

* Maintaining data stores at the locations where they are used

* Determining network channels for the appropriate
exchange and distribution of personnel data

* Determining a proper role for minicomputers and
the distribution of data processing functions

* Use of data screens for information input and update

* Reduction of hardcopy information listing
and reports

The MILPERCEN sponsored standardization conferences can provide AIRMICS
with help in the data documentation process that is absolutely essential
in a DBMS operating environment. This inter-agency study group is
currently concentrating on reaffirming the data element standards that
have not always been observed in current personnel systems. AIRMICS
needs to consider building on this effort and extending the documenta-
tion effort to include specifics on the use of personnel data elements
in the many application programs in service.

The MILPERCEN sponsored conferences seemed more directly concerned
with how data elements should be defined and coded rather than with how
they are currently defined, coded and used. A documentation effort of
this latter sort has been undertaken by the SIDPERS-RC group at RCPAC.
This group has already made headway in identifying the truly common core
of data elements used by the major Army personnel databases and has had
the foresight to maintain this information on DATAMANAGER, which
provides the type of extensive data element information required by
DBMS. Presently the data element database established by SIDPERS-RC
contains some 3,000 data elements. That database can probably be made
available to AIRMICS in a form that they can use for further study and
development.

The work of the Standardization conferences is still in progress,
but the product of the first two conferences have already been provided
to AIRMICS.

The Georgia Tech study team made some progress in acquiring the
record layouts of the personnel data files in use at MILPERCEN and at
other selected Army organizations. These files included both master
personnel records and the extract and work tape records used for
exchanging data between systems and for updating records within systems.
The data elements found in these records were catalogued and placed
among the materials provided in the appendices found in Volume II of
this report.

The ERAD study group has been engaged in a work effort that should
assist AIRMICS in dealing with the interface between MILPERCEN's OMF and
EMF. This group has identified the universe of Army personnel data

elements which personnel managers claim they need to have automated in order to carry out their functions. One objective of the ERAD study is to create a single personnel file for both officers and enlisted personnel (to be known as the Individual Record Brief or IRB). In this connection, it is worth noting that RCPAC's personnel data already exists in this combined form. This approach to interfacing the OMF and EMF has obvious implication for any AIRMICS effort to design DBMS software for the active army personnel system. The work product of the ERAD study group is referenced in the appendices of this report and a listing of their universe of personnel data elements forms one of the appendices.

In reviewing the current status of personnel data management within the Army personnel community, then, the Georgia Tech study team has found much evidence that there is a well-developed receptiveness for the type of DBMS research which AIRMICS wishes to undertake. Enough has been and is being done within the Army personnel community to insure that the AIRMICS effort will provide research outcomes that will have next term benefits for upgrading the current personnel information management systems. As pointed out previously, concern for Mobilization and Wartime operating conditions only makes this type of research even more desirable. In engaging in research on DBMS applications within the Army personnel community, AIRMICS will be dealing with a number of different interface problems, all of which should prove amenable to resolution by DBMS technology. This section will conclude with a brief overview of these interfaces.

1. Interface among the Active Army, the National Guard and the Reserve Army. This interface is characterized by the need to have a smooth transfer of gain and loss transactions among databases which need to maintain their separate identity and control. There are, however, administrative and financial reasons for insuring that these databases are in a position not only to register and accomplish individual record gains and losses, but at the same time to permit mutually beneficial inquiries. Because of the different information needs of the separate Army organizations, the data element content will never be entirely uniform. Attention should be paid, however, to insuring that common elements observe approved standards of definition and structure. The respective organizations also need to be kept current of the unique elements maintained in the other databases and have the technology to access that information in accordance with approved security and access procedures.

2. The interface between MILPERCEN master files and SIDPERS Installation files. This is the main pipeline interface by which OMF/EMF records are updated. Transactions across this interface are critical to the validity of the MILPERCEN master personnel database. This interface also introduces the most challenging potential for design reorganization under DBMS. DBMS offers the potential for consolidating the MILPERCEN and SIDPERS database into an integrated, distributed data processing system. From the observation of the Georgia Tech team, this remains a long-term, remote concept in the thinking of most current Army personnel data managers. For that reason, and because of its inherent complexities, it will be the interface requiring the most intensive research activity on the part of AIRMICS.

3. The MILPERCEN interface with the USAFAC JUMPS file. Both MILPERCEN and USAFAC maintain their own separate pipelines to field level data. At the Base/Installation level, the MILPERCEN database is serviced by the MILPO, while the FAO serves as the USAFAC point of contact. At present, the top of the system exchange of data between MILPERCEN and USAFAC provides each organization with personnel information useful for validating and purifying their respective files. Using DBMS concepts to establish a common Army personnel database would effectively eliminate this interface. Past attempts to consolidate pay and personnel data have been ineffective, and the issue remains a sensitive political one for both organizations. It seems safe to conclude that the difficulties here will never be entirely resolved until the Army has a personnel database accepted as reliable by both organizations. Dealing successfully with this interface should be considered an important, but long term outcome of the AIRMICS research effort.

4. Database extracts provided by MILPERCEN to other Army organizations. USAMSSA and other major Army commands routinely receive OMF/EMF extracts and other reports based on these databases. In many instances, this interface requires the modification of raw OMF/EMF information into formats and structures required for the data to be useful to the receiving organization. This introduces a layer of work tapes into the MILPERCEN data processing environment which raises the question of unnecessary data redundancy. This problem is currently under study as part of the mission of the Data Standards Conferences. DBMS can be expected to have data extracts and reporting capabilities that should greatly reduce the data duplication introduced into a system by the use of work tapes. This should be one of the near term outcomes of the research effort envisioned by AIRMICS.

5. The interface required to answer special and routine queries to the OMF/EMF databases. Activities of this type are currently worked against the System 2000 database and the compressed OMF/EMF tapes processed with ODIS. Since DBMS technology is specifically tailored to improvements in this type of data processing service, the AIRMICS research effort can be expected to produce significant near-term improvements in this type of interface. This is also the interface that will have the most visibility with end-users and should vastly improve field level support for the entire system. Improvement in this area can also be expected to produce spin-off effects on MILPERCEN's capability for keeping data validity at a high level. As end-users are able to interact with data as it actually exists in the database, they become a new and effective data checking resource.

SECTION IV.

ISSUES RELEVANT TO THE INTERFACING OF ARMY AUTOMATED PERSONNEL DATA SYSTEMS

Previous sections of this report have reviewed the current status of Army automated personnel data systems, and have sketched an outline of what an effective, integrated system might look like in the future. The present task, then, is to consider the prospects for making a smooth transition to a system able to meet the needs of Army mobilization and to take full advantage of current information systems technology. These prospects may be examined in terms of five major issues. These issues are identified and discussed under the headings presented in the remainder of this section.

1. THE ISSUE OF OFF-LINE PERIODIC DATA TRANSFERS

The work statement that motivated this study suggested that serious problems existed as the result of the fact that present system interfaces were off-line and periodic rather than on-line and interactive. The following sentences may be directly quoted:

"The data transfers [in particular, between MILPERCEN, JUMPS, and SIDPERS systems] are accomplished on a periodic basis via a magnetic tape interchange between system proponents. This method for maintaining data integrity between systems is inefficient and results in costly manual processing to resolve intersystem discrepancies. There are no conversational, interactive processes involved in the efforts to use data base information from differing Army agencies."

This statement was no doubt meant to be nothing more than a tentative and exploratory description of the problem. However, one should note that the statement rather clearly characterizes not only the problem but also the expected solution; for, according to this statement, the problem is that off-line processing results in "costly manual processing to resolve inter-system discrepancies," and the remedy to "costly manual processing" is the development of interfaces with interactive capabilities.

The work statement also suggests, as a solution to the above-identified "problem," the creation of:

"... a common data bank, or data utility...The data bank would be established by consolidating the personnel and financial data bases of MILPERCEN and USAFAC into an automated system providing a single, unimpeachable source of data for the personnel and financial activities.

Although the data bank concept is currently under investigation only by MILPERCEN and USAFAC, it is generally

accepted that the concept could be extended to serve the other members of the personnel community. The data bank would provide a data sharing utility including the interfaces necessary to satisfy all mutual data accession requirements of members of the personnel community and USAFAC. The data bank would provide a data sharing utility including the interfaces necessary to satisfy all mutual data accession requirements of members of the personnel community and USAFAC. The data bank would also eliminate the need for off-line transfer of data bases, or portions thereof, between high-level Army managers for the purpose of data management and strength reconciliation."

Before proceeding further in a discussion of interface issues, it is important to try to estimate the extent to which the preceding statements are in fact accurate characterizations of the current situation. In this regard, one might make the following observations:

  * There is no real indication that reconciliation of data between the JUMPS and MILPERCEN (OMF/EMF) results in costly manual processing. At present, neither USAFAC nor MILPERCEN allocates any substantial portion of its resources to the effort of manually reconciling specific mismatches or inconsistencies between the two systems. To the contrary, such inconsistencies seem in general to be of little concern to system managers, who know that most mismatches are temporary, resulting merely from different processing cycles at USAFAC and MILPERCEN. Realignment of the processing cycles at USAFAC and MILPERCEN would therefore resolve a large percentage of the data discrepancies (and there has been some effort to study the possibility of making such a realignment); however, there obviously has been no sense of urgency on the matter, for the apparently good reason that the "problem" is not a very serious problem at all. That is to say, it does no real harm, and therefore is in no way seen by system managers to represent an alarming state of affairs.

  * In contrast to the interface with JUMPS, the interface with SIDPERS seems to require somewhat more elaborate manual processing efforts in order to resolve individual discrepancies. However, those discrepancies exist less on account of the lack of an interactive interface than on account of a lack of controls on the information processed. In other works, the problem is not an interface problem so much as it is a data capture problem. Data coming from SIDPERS to MILPERCEN is overlaid on the existing OMF/EMF file without sufficient checks to make sure the data is accurate. Therefore, every time a MILPO makes an attempt to update an item in a master record, there is the serious possibility that brand new errors will be introduced into the file — for there is no procedure to prevent their introduction into the OMF/EMF. (It must also be observed here that the system in no way checks the performance of the SIDPERS clerks...no clock starts running when a MILPERCEN action calls for an

action at a given base... the diligence or lack thereof of a given clerk goes unchecked.)

* Interfaces between OMF/EMF and systems other than SID-PERS and JUMPS do not appear to require interactive processing capabilities. At DCSPERS, for example, there is a mission-directed need to develop an independent data base quite different from the data base maintained in the OMF/EMF. In order to make strength predictions, DCSPERS requires data aggregated and classified in a longitudinal data base maintained for seven years. DCSPERS therefore is interested in aggregates rather than individuals, in trends rather then in the current situation. Thus, "off-line, periodic data transfer" from the OMF/EMF is quite adequate to DCSPERS purposes.

What emerges from these facts is the conclusion that the document which motivated the project misstated the nature of the problem, and pointed toward a solution which is not appropriate. There is no urgent problem with regard to the management of existing interfaces; to the contrary, the system managers both at MILPERCEN and elsewhere appear to be doing an exemplary job in regard to the interfacing of existing systems, given the history and nature and complexity of those systems and the obsolescence of the hardware and software available to support them. The problem, therefore, is not with the system INTERFACES; the problem is with the SYSTEMS THEMSELVES — systems which are now out-of-date and entirely unable to take advantage of current state-of-the-art information systems technology.

2. THE ISSUE OF MANAGEMENT CONSENSUS

Given the complexity and size of the various automated systems related to Army manpower management, it is not surprising that a large number of separate but overlapping studies have been initiated within the last several years. For example, a number of joint MILPERCEN-USAFAC studies were brought into being as a result of a memorandum of understanding written by General Crosby. In addition, there has been the COPPER report, the MAPS report, the ERAD study, etc., plus on-going internal studies by groups such as the Research and Analysis Branch of the Data Base Management Divison of PERSINSD.

In order for outsiders such as the present researchers to take a realistic approach to the formulation of recommendations for choosing any particular direction for further study or action, it is necessary that they pause to reflect on the history and status of these studies.

Of the various projects mentioned in the General Crosby memorandum, only two remain in any kind of active status, and of those two only one is proceeding forcefully: the data element standardization project. As for the other reports: the COPPER report has been rejected; the ERAD study remains controversial; the MAPS program is not at all assured of management acceptance or completion.

The existence of all these study efforts leads quickly to the

conclusion that managers are doing their utmost to exercise their
responsibilities for administering their systems in a way that maximizes
opportunities for effective interface with other systems; but the
failure or slow progress of most of those same efforts leads to the con-
lusion that efforts such as these have been founded in a global perspec-
tive that makes real progress impossible or at least difficult. Whereas
consolidation of OMF/EMF (strictly within the purview of MILPERCEN)
seems to be proceeding rapidly, one sees that, in contrast, those
reports dealing with interagency cooperation (e.g., the COPPER report,
the studies outlined in the Crosby memorandum) have been rejected or
abandoned, and the MAPS project seems far from implementation.

It would seem that no one group has management (as opposed to
staff) responsibility for the overall task of interface management. The
interfacing between discrete systems has historically been treated as a
problem of liaison and coordination rather than a problem of design and
management. Therefore, the interfacing question has been given to
staff/liaison groups such as the AMO´s, rather than specifically to a
design/management group such as DBMD of PERSINSD.

The high rate of failure of interfacing studies would seem to sug-
gest that no substantial progress is possible regarding the development
of state-of-the-art Army personnel systems until there is developed a
management consensus within the personnel community, with interface
defined not as a connection between independent systems, but rather as
one between inter-dependent subsystems of a single system, with a single
management.

3. THE ISSUE OF DATA PROPONENCY

Included in the project work statement was the clear suggestion
that one of the important obstacles to effective interfacing has been an
insufficient degree of formalization with respect to the designation of
data proponency. Indeed, one of the joint USAFAC-MILPERCEN study teams
was tasked to propose a resolution for data proponency issues that exist
between the two agencies. Of course, that study was one of the ones
which has been abandoned, but at least one other similar effort (within
MILPERCEN itself) has been initiated.

Two major difficulties arose when the present researchers attempted
to inquire into the nature of the data proponency problem. The first is
that there are different, sometimes ambiguous, and sometimes conflicting
uses of the phrase "data proponency." That is to say, a "proponent
agency" is sometimes thought to be the one responsible for legal
definition of a term or "data element"; sometimes as the one responsible
for the standard formatting of a data element; sometimes as the one most
interested in the data; sometimes as the one which first collects the
data; sometimes as the one most likely to have the most accurate data.
Thus, the data proponency issue is easily decided only in those
relatively few cases in which a single agency´s relation to a data
element happens to meet ALL the above criteria; in fact, in all other
cases, the issue can by definition never in fact be resolved entirely,
unless an arbitrary decision is made to choose just one of the possible
perspectives on data proponency as the "correct" one; this, however, is

not a realistic approach, for each of the perspectives mentioned has at
least some legitimate claim to be the most important one.

A second difficulty that confronts analysts attempting to deal with
the notion of data proponency is the fact that, perhaps contrary to
one's expectation, agencies are not necessarily anxious to accept
designation as a proponent agency. One senior officer said: "We would
love to have [a particular agency other than his own] accept proponency
[for data elements x,y,z], because that's the business they're in;
that's their responsibility. But they refuse to accept it; and it's
probably just as well — because we don't trust their data." (Note that
he was obviously thinking of data proponency in at least two entirely
different senses: first, in the sense of DATA ELEMENT proponency,
second in the sense of DATA proponency - from the particular perspective
of data ACCURACY.)

The confusion in which proponency notions are enmeshed suggests
that data proponency is an unlikely key for unlocking the solution of
system interface problems. Ill-defined proponencies are not the CAUSE
of the interface problem; to the contrary, proponency becomes an issue
only as a CONSEQUENCE of that problem. If there existed within the Army
a management consensus such as the one alluded to above, the Army
automated personnel systems could be administered as a single system,
and proponency issues would be resolved pragmatically rather than
theoretically (and, it might be added, unworkably).

4. THE ISSUE OF DATA ELEMENT STANDARDIZATION

Data element standardization is one of the few problems which have
continued to receive sustained attention at the multiagency level.
Regular meetings have been held under the auspices of MILPERCEN (and in
particular the auspices of the Data Base Management Division of PER-
SINSD); these meetings appear to have resulted in an impressive degree
of progress.   However, it needs to be noted that, like the proponency
issue, the standardization issue contains more ambiguities than is
sometimes realized. The basic reason for such ambiguities is probably a
result of the fact that standardization is always purchased at a price,
and when the price is high enough, the standardization effort is either
abandoned or, more likely, trivialized. Granted, it is difficult to
find anyone willing to say a bad word about standardization (or mother-
hood); but it is also difficult to find anyone who is genuinely
optimistic that global standardization is a goal that can actually be
achieved.

For example, one system manager who was interviewed said: "I've
been around here twenty years, and they've been talking about standar-
dization all that time. But what good has it done? Where's the stan-
dardization? They'll be talking about standardization twenty years
after I'm gone."

Somewhere between the pessimism of this last statement and the
optimism it refutes is a realistic attitude which regards standar-
dization not as an end in itself but merely as an instrument for
achieving certain objectives. When such an attitude is adopted, and

when the objectives are themselves realistic and also relatively well-
defined, then and only then does a standardization effort have a chance
of being both successful and genuinely meaningful. This being the case,
it is crucial to determine a strategy for relating standardization
efforts to specific organizational needs.

One way of making such a determination is to look at the standar-
dization problem in conjunction with the documentation problem. When
this is done, many of the "problems" of nonstandardization turn out not
really to be problems at all. That is to say, format differences
between a single data element contained in two different data bases may
in fact be different for some good reason; and if that is so, then the
fact of nonstandardization will be good rather than bad — providing of
course the differences are well-documented and known to users of both
systems.

However, that proviso is crucial, and the Army personnel community
should carefully reexamine the state in which the documentation of its
automated systems currently exists. Documentation of data flows, record
layouts, data formats, common data elements, system protocols, etc., are
not activities which can be casually assigned to an internal ad hoc
study group or to outside consultants on a short-term project. They
comprise a major management responsibility that must be implemented and
managed on a massive and on-going basis.

The lack of careful documentation within the Army personnel com-
munity is a problem which needs immediate and aggressive management
attention. At various times during the course of this project the
researchers found themselves unable to obtain information that ought to
be routinely available to anyone asked to analyze the effectiveness of
system interfaces. This is of course not to say that there exists no
system documentation whatsoever; it is merely to say that existing
documentation is inadequate, not readily available, and not forcefully
managed. Serious thought therefore should be given to the possibility
of creating at a high level within MILPERCEN an office of systems
documentation, which would develop and maintain multisystem documenta-
tion efforts.

5. THE ISSUE OF OPERATIONAL RESEARCH

Like the documentation effort discussed above, the operational
research effort needs to be on-going, comprehensive, and managed as a
major management activity. At PERSINSD within MILPERCEN, this effort is
conducted primarily by the Data Research and Analysis Branch of the Data
Base Management Division. At USAFAC, a similar activity is conducted.
Both activities focus serious and useful attention to system problems
related to the MILPERCEN-USAFAC interface and other interfaces, as well
as to internal systemic problems within the individual organizations.
Beyond such fine efforts, however, it would be very worthwhile to have
statistical studies done which are not now available.

Specifically, studies would be extremely useful if they documented
the number and kind of accesses made to the various data bases. An ap-
propriate data base design can not be created until there is available a

vast amount of information on how the data base is actually used or to be used by actual users. Information of this kind can be obtained only through a long-term operational interest and effort to maintain relevant system usage statistics. At the present, there is no way of knowing, for example, how many requests were made last month by users wanting to know something about medals and awards; yet such information is essential to designers seeking to develop an efficient and effective automated system for personnel management. If there is frequent and extensive use of data on medals and awards, then one kind of data structure is appropriate for the data base which holds that information; on the other hand, if there is virtually no extensive or critical use made of such information, then a different kind of data structure will be appropriate. When detailed statistics of this kind are not available on all of the elements in the various data bases, a truly rational data base design process is not possible.

One approach the Army personnel community might consider to remedy this problem is to incorporate into the programs of each automated system a set of counters which will produce usage statistics for all data elements. Adoption of such an approach would have an immediate, short-term cost in programming effort and system run-times, but would yield high long-term benefits, by providing information that systems designers simply can not afford to be without.

SUMMARY OF ISSUES

The recommendations made in Section VI of this report are responses to the issues raised above as restated in the following five questions.

(1) Is the development of automated system interfaces practicable or desirable prior to the redevelopment of the primary systems themselves using modern, state-of-the-art information systems technology?

(2) In what ways can systems interfacing be accomplished by technical means prior to the resolution of major questions related to overall management direction within the total Army personnel community?

(3) Can the redevelopment of automated information systems within the Army personnel community facilitate solutions to the problem of clarifying organizational boundaries and responsibilities relative to Army personnel data?

(4) Can the data element standardization effort hope to be successful if standardization activities are not transferred from an ad hoc basis to one which is permanently constituted and able to assume major, on-going management responsibility for documentation (and documentation maintenance) of all automated Army personnel information systems and their interface requirements?

(5) To what extent will it be possible to effect the administrative changes necessary to accomplish the massive information collection functions which need to be conducted prior to the design specification for state-of-the-art hardware/software required for current and future needs of the manpower information systems needs of the modern United States Army?

What will emerge in the following pages of this report is that the degree to which the Army will be able to answer those five questions will be a function of whether it is first able to provide a mechanism for facilitating the development of a comprehensive framework for planning the long-range future of information-technology ulitization on behalf of Army personnel management.

SECTION V.

WORKSHOP FINDINGS

With Sections I. through IV. of this report serving as a background document, the participants in the Army Human Resources Management Information Systems Workshop held in Atlanta on October 6-8, 1980, were able to review the salient features of typical Army personnel organizations and to arrive at a broad consensus concerning the major issues, problems, and opportunities for improvement within the Army's personnel information systems. Though there were some minor disagreements among the Workshop participants, those disagreements were far less important than the clear consensus which was reached on the principal topics covered. Those topics were "System Objectives"; "Major Problems in the Personnel Information Systems Environment"; "Proposed System Solution"; "Impediments to System Development"; and "A Plan for Action". The consensus achieved on the identified topics is reported in the following pages.

Some members of the Workshop concluded that their initial thoughts on the problem of defining system objectives had been rather naive, and that, though the topic of system objectives had at first appeared to be relatively straightforward, the actual analysis proved to be much more difficult. The systems objectives of the Army's Human Resouces Information Systems turned out to be elusive, and not quickly agreed upon.

The primary reason for this difficulty was that, unlike virtually all private sector organizations, the Army is required to design a system that will provide optimal service in each of two radically different circumstances: peacetime and wartime. This is tantamont to being required to design two separate systems, with two separate and in many ways quite different sets of objectives. The transition from peacetime to wartime must be swift and secure. The transition from wartime to peacetime must preserve and maintain data.

The Workshop members agreed that dichotomous objectives were involved. Basically, the system would be asked to maintain an operational readiness to fight a general war (which is, after all, the mission of the Army), and yet, at the very same time, serve the day-to-day vital needs of the Army in peacetime.

It was observed that there has not been an all-out mobilization since 1945, and that most of the years since then have in fact been years of relative peace; thus, it is necessary to be cautious in using an otherwise valuable slogan such as: "design for war; modify for peace." Modification of a system works best (if at all) when the modifications required are relatively minor. On the other hand, if the modifications are numerous and/or vast, the modified system will tend to prove unsatisfactory or unworkable. There is the real danger that a system designed to achieve two different and somewhat incompatible sets of goals will achieve neither.

As a result, the Workshop participants felt that personnel resource management should provide accurate and timely information in the modes appropriate to each of two different conditions. First of all, the primary mission is to achieve the maximum personnel readiness for any military contingency; this is the Army's number one, first-and-foremost objective. Second, the Army must maintain an effective resource management system for time of peace; that is, it must be able, in an efficient and effective way, to go about the routine but essential business of personnel management of the sort conducted regularly by any large enterprise, private sector as well as public.

For personnel readiness for any contingency, which must remain the first and ultimately most important component of a Human Resources Management Information System for the Army, information must be available and responsive to the needs of managers. Furthermore, this vital information should be equally available to all decision makers with the need-to-know, regardless of their organizational affiliation: that is to say, the system should be designed to serve the needs of the entire fighting Army, not just a segment of it.

Another point is that the data base that contains this information should be designed so that it can be expanded rapidly in size. The Workshop participants agreed that the Army needs to be talking about a wide range of possible military contingencies, from "brush fires" to general war situations, and needs to be thinking about a system design that will be immediately responsive to increases of varying sizes depending on mobilization requirements.

The second major objective of the information system is easier to characterize, for it more closely resembles the kind of human resource management information system found in the civilian world. For the sake of consistency (and to provide a contrast with the "lean and mean" system required for war time), the Workshop participants also insisted that the system needed to be "fat and happy" (i.e., responsive to individual career aspirations, geographical preferences, and all the myriad subtleties of human resource development). The second objective may be enumerated as follows:

* Maintain longitudinal data
* Maintain historical data
  - Assignments
  - Education (Civilian and Military)
  - Awards; etc.
* Maintain demographic data
* Maintain planning data for forecasting
* Evaluate and maintain appropriate forecasting models
* Provide analysis and reporting tools which are responsive to ad hoc requirements.

In contrast to the requirements associated with the first objective, it can be seen that the human resource management information system needed to meet the second objective is more of a traditional

human resource system in that it maintains historical data, requiring
traces of previous assignments, education, and all of the other things
needed to run the day-to-day operation in the face of myriad privacy,
individual rights, and EEO requirements. The required system has two
major goals, rather than one. Yet the most significant aspect of this
dichotomy is not simply that they are two different goals, but that
these two goals are vastly different from one another, and perhaps in
some ways not entirely compatible in one system intended to optimize
under either or both conditions.

Major Problems in the Human Information Systems Environment

The second topic upon which a broad consensus was reached was the
subject of major problems in the personnel information system
environment. The Workshop concentrated on the task of identifying and
enumerating currently existing problems in the Army's personnnel
information systems environment, and agreed that because there are so
many problems it is important to zero in on the single problem which is
the root of all the other problems. This simple crucial problem is the
lack of an organized, disciplined, and systematic approach in managing
data processing in the Army. Of course, the Army is not the only
organization lacking such an approach; all other sectors in the gover-
nment and many private enterprises are probably generally a victim of
the same problem ... nor are all private sector organizations to be
excluded.

The participants agreed that the problem started with a semantic
inadequacy, in that we have an inability to define what a system is. It
is generally defined very loosely as any collection of software and/or
hardware operating at any level. The participants, however, felt a need
to view the personnel management system as an abstract system which
deals with regulations, procedures, requirements, etc. Thus, some
particular set of hardware and software merely represents tools that
serve and support that system. Yet, in practice, we tend to ignore that
distinction. We look at everything that is hardware and software
oriented as a system. When we take this viewpoint for a system
definition, our systems become poorly managed, exhibit a poor design,
and appear as ad hoc evolutionary creations. Requirements simply arise
and evolve, and nobody specifies them carefully at whatever level they
happen to develop. There is no mechanism for placing such requirements
in a priority order.

Therefore, system requirements as part of the software development
cycle continue to be a problem within the Army as a whole. A Detailed
Functional System Requirement (DFSR) is often talked about but never
used. Specification of requirements and validation of requirements is
rarely carried through. This results in system designs that never take
into account that they will ever have to be integrated. This in turn
makes efforts toward standardization difficult.

The consequence of all this is that there is no determined effort
nor are there resources for using state-of-the-art techniques. Managers
often say, "Why isn't this system on line?" Yet the systems are already
saturated operating in a batch mode processing serially. How are they

going to be able to do interactive on-line processing? Such systems can not simply be modified or upgraded; every single one of them has to be totally redesigned to become on-line to utilize data base management systems and concepts. The manpower necessary to develop the software and the equipment to utilize it are just non-existent; and this is a serious problem. These are just a few examples of the lack of a determined perception that the whole system has to be managed. If managed, then it is managed by hundreds of separate managers.

Another problem is the relatively low level of user participation. User participation occurs too far back in the development stage to significantly influence the plan, and user validation of requirements occurs after the system is fielded. On the other hand, there are various mitigating factors in the Army situation. First, the users in the corporate structure, no matter how large, are relatively closer to each other than are users in the Army, particularly in the case of the centrally developed systems that are going to be used throughout Europe or all over the world. Secondly, the private sector has a unique capability of validating the success or failure of one of its systems: a year or so after a system is launched, if it is not producing a profit, you know that it is wrong. In contrast, systems designed for the Army are not intended to make a profit; their sole purpose is to prepare for the defense of the country in time of war, and that fortunately does not happen too often. They are very seldom put to any real test.

Another pervasive problem is that systems can not meet expansion requirements; they are not flexible to change and to the changing scenarios. Existing systems, because of their age, are batch-processing-oriented and fragmented; they can not be integrated to meet the operational requirements. The consequence of all these problems is that many managers throughout CONUS are designing their own systems as expediencies to support local decision-making process, and this is the heart of the problem. As a result of not going anywhere and of the difficulties managers have encountered with existing systems, managers have directed supplementation of those systems with systems of their own. These new systems are operating on the periphery.

To summarize, the Workshop participants agreed on the following catalog of problems in the current environment of the Army's human resource information systems:

> * Any collection of hardware and/or software which supports one or more functions is called a system. Many of these systems are based on ad hoc requests with little or no specifications and no pre-determined interfaces with other systems and are not well understood by their users.

> * Links between traditional personnel functions and other activities (for example, finance) are not clearly defined.

> * There is a lack of standardization of hardware,

software, and data elements.

* There is no determined effort or ability to use
available state-of-the-art technology (for example,
telecommunications, and particularly on-line
systems).

In short the problem is that there is in general a serious lack of
any organized, disciplined, and systematic approach to the management of
the Army's personnel information resource. There is no real system.

Proposed System Solution

In considering the task of charting a proposed answer to the Army's
human resource management information needs, the Workshop participants
re-emphasized the urgency of correctly identifying the basic problems.
As can be seen from the accompanying diagram, the group did not attempt
to identify some specific solutions; instead, the participants focused
their concern on the urgency of rationalizing and implementing an effec-
tive solution process. Thus, in the opinion of the Workshop
participants, the real solution to the Army's systems design problem is
possible only by getting the problem clearly identified and on record.
The problem has to be written down in a way that will be understood by
managers on a variety of levels. What the Workshop participants felt
had to be done was to identify the issues faced by the system designers
and to accurately describe whatever requirements had to be met, so that
the solution could be identified in terms of issues and guidelines and
be produced in a document. The document should be prepared by an
outside, unbiased agency, and should be provided to the various people
in the personnel community. The people in that community should then be
able to address these issues and to develop a plan about how they would
integrate their system and needs with other members of the personnel
community, but do this work independently. These ideas would then come
up to a local body, such as DCSPER, that would review these individual
plans. At that point the individuals should be assembled in a con-
ference or workshop in order to exchange ideas about the various plans.
This would result in a multi-level task force that would then develop
the plan of action to go about integrating these systems. This multi-
function task force would come from these people and be headed up by
DCSPER, and would include staff representatives, top line staff, and
technical personnel. The action plan itself would have to state goals,
identify the steps to accomplish this integration, establish priorities,
and identify research requirements in terms of dollars, people, and
time. There are on-going organization activities to test the existing
systems. If these turn out to be a failure, the failure itself would
hopefully impact these guidelines and put some pressure on upper levels
of management to make some changes.

One of the things that has to be going on all the time during this
process is public relations. The idea is to publicize the entire
process, by saying: "This is what we are doing, this is why we are
doing it, and these are the issues." It is absolutely necessary that
all of the members of the Army staff and organizations are aware of what
is going on. PR would be a key element in the search for a successful

Public Relations (PR) Conducted
Throughout Solution Process

PR

```
                        ┌─────────────────────────────┐
                        │         Inputs:             │
                        │  1. Results of Proud Spirit │
                        │     MOBEX-80                │
                        │  2. Relevant Issues and     │
                        │     Guidelines              │
                        │  3. Outside Help through    │
                        │     Consulting/Research     │
                        └─────────────────────────────┘
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| MILPERCEN | RCPAC | RECCMD | Other Army Commands |

Synthesis of Ideas

DCSPER Reviews other
Related DOD Efforts

Multifunction
Task Force

Action Plan: Goals
              Steps
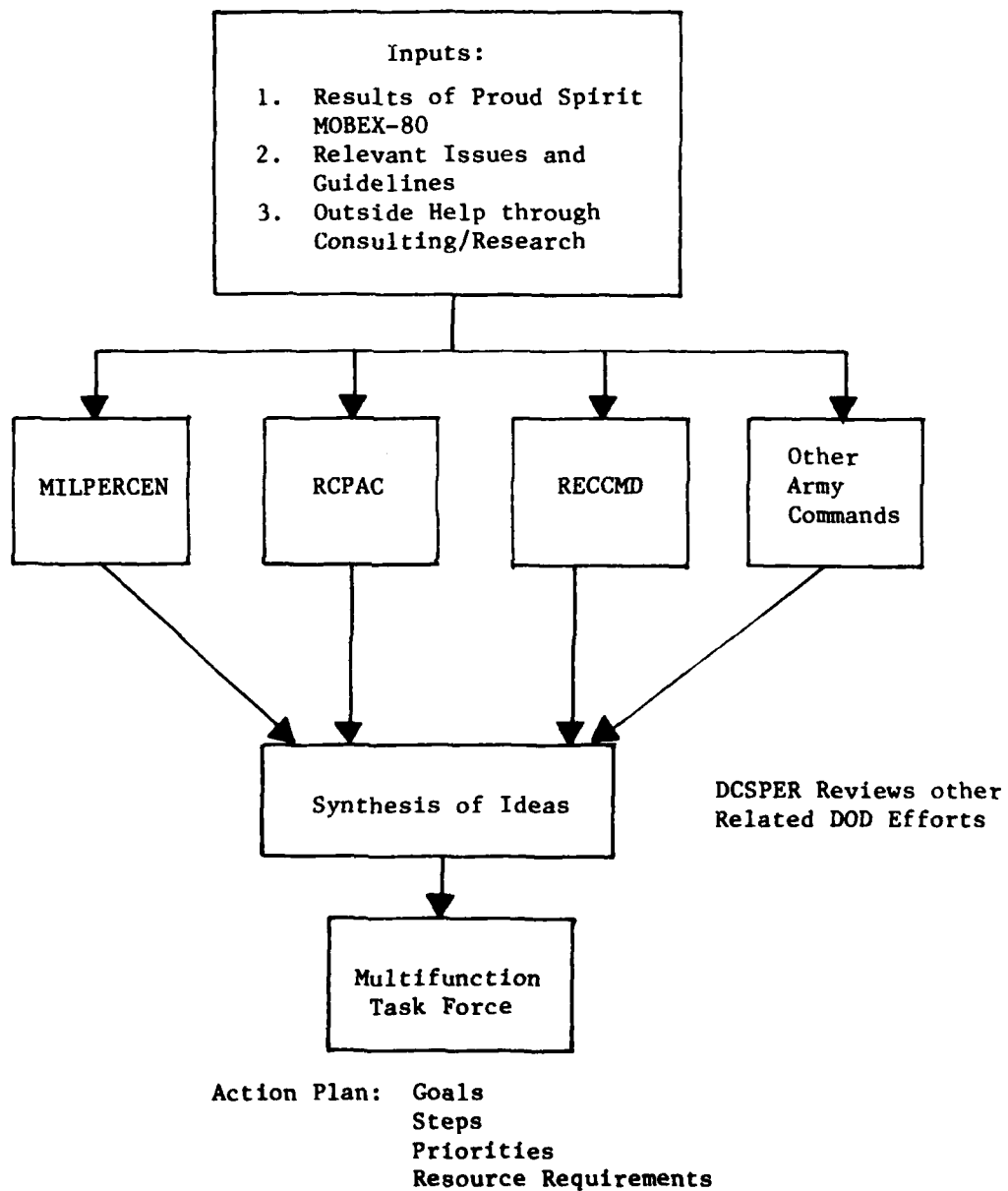   Priorities
              Resource Requirements

FIGURE 1

system solution.

Of course, as one of the Workshop participants pointed out, there are two kinds of PR involved. One is concerned with what is being done overall; the other involves individual personalities. Many people who are doing various functions will be leaving those functions very shortly, because the longest they stay is generally two years. Each individual must recognize a short term set of goals that are achievable during his/her tenure that provide management actions which will contribute to the long term solution of personnel problems. This will fulfill the second kind of public relations. The emphasis by the Workshop participants on PR and on the problem definition indicates that what is proposed is not a solution in the typical sense of the word. That is to say, there is no proposal here for some kind of integrated data base that is going to meet all needs. One of the conclusions reached at the Workshop is that, technologically, there are paths to a solution, and that the technological aspects of the problem are relatively simple compared to the organizational and planning problems. The first step is to determine what process is required to get the job done, and this includes all the relevant issues. The word "relevant" is important. The Workshop participants did not feel it appropriate that commanders be asked questions about what they think about common data bases and other technical matters; commanders should focus their attention on whether they think they can mobilize in time of war, and other such problems directly relevant to their command positions.

Another point is that the probability that something will be done about this is very low. In times of crises, something will be done about it, but it will probably be sporadic. Probably the wrong things will be done. A very valuable contribution of this process, therefore, will be an action plan well thought out in time of peace, with involvement of all different factions: such a plan must be stepped out, must have priorities, and must be given resources. Even if the plan lays on the shelf for years, it is still an action plan that could be put in place. Some frame of it could at least be used in time of crisis.

The Workshop participants agreed that if Proud Spirit turned out to be a failure, that would be the time to start the PR. PR should begin as soon as you recognize that there is a problem, and this should continue all through the system development process. Of course, one difficulty involved with such an exercise has to do with establishing the criteria for success or failure. For example, there were many systems problems identified two years ago, and those problems have since been solved. The test may now be: "Did you solve those problems?". Another difficulty is that the criteria for true success is high.

As the Workshop proceeded, attention of the participants turned to the difficulties of communication among the various components of the Army personnel community, and the complexity of the problem seemed so great that some of the participants questioned "whether we know what we are really trying to solve". But the final consensus was a re-emphasis of the fact that a real and lasting solution to the problem would come only through the development and implementation of the solution process

that would facilitate full exploration of all the problems and that would address organizational weaknesses which were identified during the Workshop. As one participant expressed it:

> "I think we do know what we are trying to solve; we are trying to solve the conditions which impede a successful technical solution. If we go back to the problem statements developed earlier, we see that we don't have a flexible system that is responsive and flexible. The solution then is to develop a system which has these characteristics, and the only way to develop such a system is by first developing a plan for defining the requirements. The first important end-product is a careful and accurate definition of the defined requirements."

In general, whereas industry is building state-of-the-art information systems to support its needs, the Army has only pieces of information systems that qualify as state-of-the-art. In many cases these information systems as a whole are not responsive to the Army's needs. To get responsiveness, the pieces need to be integrated into a whole. The Workshop participants, after considering the problems, concluded that the real problems were actually organizational and financial rather than purely technical. In some cases the technical problems have already been resolved. Hardware issues are not the problem. The core of the problem is principally non-technical, and any action on the problem should be directed at making the issues known to key personnel in the Army.

Impediments to System Development

The Workshop participants came to a consensus on the following inventory of impediments which must be overcome by designers tasked with the development of the human resource information management system for the Army:

1. Lack of leadership that is able to perceive the true issues and problems and that is both desirous of and responsible for solving them; i.e., there is no single person in charge.

2. Excessive organizational and mission diffusion within the human resource management information area, characterized by

   a. Parochial interest of separate commands.

   b. Perceived loss of ownership of data bases.

   c. Problems in coordination and tasking.

3. Excessive procurement and implementation time and cost.

4. Lack of planning, along with the propensity to

"put-out-fires"; insufficient vision, courage, commitment, and understanding.

5.   Inability to define functional requirements. The Army is not organized under the functional sub-definitions of manning (i.e., recruitment, training, assignment/distribution, sustainment, separation), and this causes reluctance to plan and an inability to define functional requirements.

Thus, the greatest impediment is that there is no one person in charge of the entire human resources management information arena; instead, there are numerous organizations, none of which are under the same person with the same kind of mission. Those organizations should either be placed all under essentially one command or at least they should be given a single focus. Currently there are organizations such as MILPERCEN, DCSPER, etc., all pointed at different targets. As a result, the human resource management information system is not cohesive. Action is _not_ taken for the benefit of the whole. The various Army organizations act for their own self-interests.

However, in addition to these political or organizational impediments, another very real impediment is the excessive procurement and implementation time in the military. This time somehow must be shortened. There are of course various people working on this problem, and hopefully they will be successful in solving it.

Plan for Action

The Workshop participants came to a consensus on the need to develop a planning framework that would feature a further study effort to determine:

- Feasibility
- Resource Requirements
- Organizational Impact
- Alternative Solutions
- Mission Area Analysis

The outlines of such a planning framework are presented in the following section of this report.

SECTION VI.

CONCLUSIONS AND RECOMMENDATIONS

The research conducted under this contract has identified and sum-
marized many issues which affect the manner in which human resource
information is managed for the Army. It is clear that there are many
people and organizations concerned with improving the management of
human resource information.

MOBEX-80 revealed significant progress over MOBEX-78 and spoke well
for the perseverance and determination of the entire human resource
information community. However, it also underscored some of the obser-
vations expressed earlier in this report:

> * The obsolescence of the Army's "automated" person-
> nel system not only impacts its day-by-day operation
> but almost precludes any true mobilization effort.

> * Human resource information policies must be formed
> which eliminate the fragmentation of personnel data
> and which anticipate mobilization.

The significance of these generic issues is borne out by the
problems which emerged at the RCPAC-MILPERCEN interface under MOBEX-80.
These problems made it emphatically clear that if a Human Resource
Information Data Base is to serve both peacetime and wartime and is to
serve both the reserve command and the Active Army, etc., the data base
must contain all of the data needed by each organization. In addition,
the data needed by each organization must be available to that organiza-
tion at the time needed and must be under the control of that or-
ganization. Finally, the only data which should flow from one organiza-
tion to the other is the data needed, at the time needed, for the func-
tion requiring it.

For instance, under current circumstances, upon mobilization, there
is supposed to be a flow of records from RCPAC to MILPERCEN. This
process has major system flaws:

> * The data maintained by RCPAC is for RCPAC
> activities and is maintained pursuant to Reserve
> Command rules and requirements which are not
> congruent with Active Army requirements.

> * The number of records (even if it met Active Army
> requirements) which flow from reserve status to
> active status is very much larger than that set of
> active records maintained for peacetime.

> * When the flow of records is complete, the data
> processing resources of the Reserve Command are
> empty and the data processing resources of the

Active Army are glutted.

This situation leads to a major paradox which characterizes the whole question of peacetime vs. wartime information processing demands. If the data processing resources of the Active Army are sufficient to absorb the Reserve Command data, they go unused during peacetime. Conversely, the Reserve Command Resources stand to be empty, disjoint, and difficult to use during wartime.

What is needed is a structure or system in which personnel data is maintained in readiness and available for all purposes. Again using the reserve command issues as an example, if the needed personnel data were maintained on a basis such that the record was the same for both reserve and active status, it would only be necessary to set a status indicator to mobilize the record. If the records were maintained at appropriate mobilization centers and if the reserves were instructed as to which center to report, mobilization records would be complete by the time the troops arrived.

This scenario is of course predicated on the notion that "readiness" is the Army's business and that data required to operate a peacetime Army is a superset of the data required to operate a wartime Army. Readiness further implies the ability to demobilize without loss of important data or a state of readiness. While demobilization may not be as time critical as mobilization, it should be expeditious in order to preserve readiness and to maintain morale.

Since soldier's records (active and inactive) are never static, it is necessary to maintain both the integrity of the record and the integrity of the data which identifies: where the record is; where it and the soldier are going; when they will arrive; etc. Therefore, consider a model in which we include military facilities in which soldiers records are maintained. From the point of view of the reserve command, these are mobilization centers. The data on reservists marked inactive are maintained for reserve command purposes. The data maintained on active soldiers are a subset of the reserve data. During peace time, if a reservist is assigned to a different mobilization center, his entire record is transferred with him to that center; if an active soldier is transferred to a different military facility, his active records are transfered to the next facility. Upon mobilization, reserve records are marked active and when the soldier arrives, he and that data pertinent to his next assignment are dispatched to his new post. The remainder of his records are maintained at his mobilization center and the control center receives data indicating where both sets of data reside. While the soldier is on active status, his active records go with him. Upon demobilization the control center knows where both sets of records reside and if the soldier is mustered out at a location other than his mobilization center, all records are dispatched to his new mobilization center.

Such a system is technologically attainable. To those people who have endured the bureaucratic complexities and delays which have for so long precluded such a system, it may sound utopian, but it is utopian only in the sense that it is inevitable ─── it is the only way to go if

the Army is to respond to the information processing challenges of the present and the future.

However, the fact remains that, while one can design and prescribe such a system on paper, the Army is still not in a position to answer many important questions needed by managers whose decisions and careers hang in the balances of rapidly changing technology. For instances, the very size of the needed system exceeds anything currently operating in the private sector. The enormity of the system raises such questions as:

* What database management system should be used?

* Given the multiplicity of users, how should the data be organized?

* Under a distributed data system, would AUTODIN II allow for satisfactory response?

* Under a centralized data system, would AUTODIN II support satisfactory communications response?

* Under a centralized data system, how large a computer would be required?

* Under a centralized data system, what sort of a network of computers might be required?

* Under a distributed data system, what sort of a network of computers would be required at each node to provide required reliability?

* Under a distributed data system, what would be the nature of the control and archival center? How large and how many computers would be required?

Without some performance data to support particular design choices, bureaucrats have no choice but to defend turf. What is needed is a body of research sponsored at the DCSPERS level. This research should generate empirical data regarding such phenomena as the performance characteristics of existing DBMS packages operating in an environment of several million personnel records being accessed according to a variety of scenarios, such as a scenario characterized by distributed data, distributed data usage, and central control; one characterized by central data, central control, and distributed data usage; etc.

Figures 2 and 3 illustrate the two primary system concepts which appear to meet the Army's HRIDB needs. Figure 2 is based on the concept of a distributed data model which assumes the need for a central system which does not have real time needs for the detailed data maintained at the various military facilities. It does however have need for aggregated data for performance monitoring, etc. It also possesses the data which describes the HRIDB in terms of what is located where. For instance, suppose that upon mobilization, some reservist cannot report
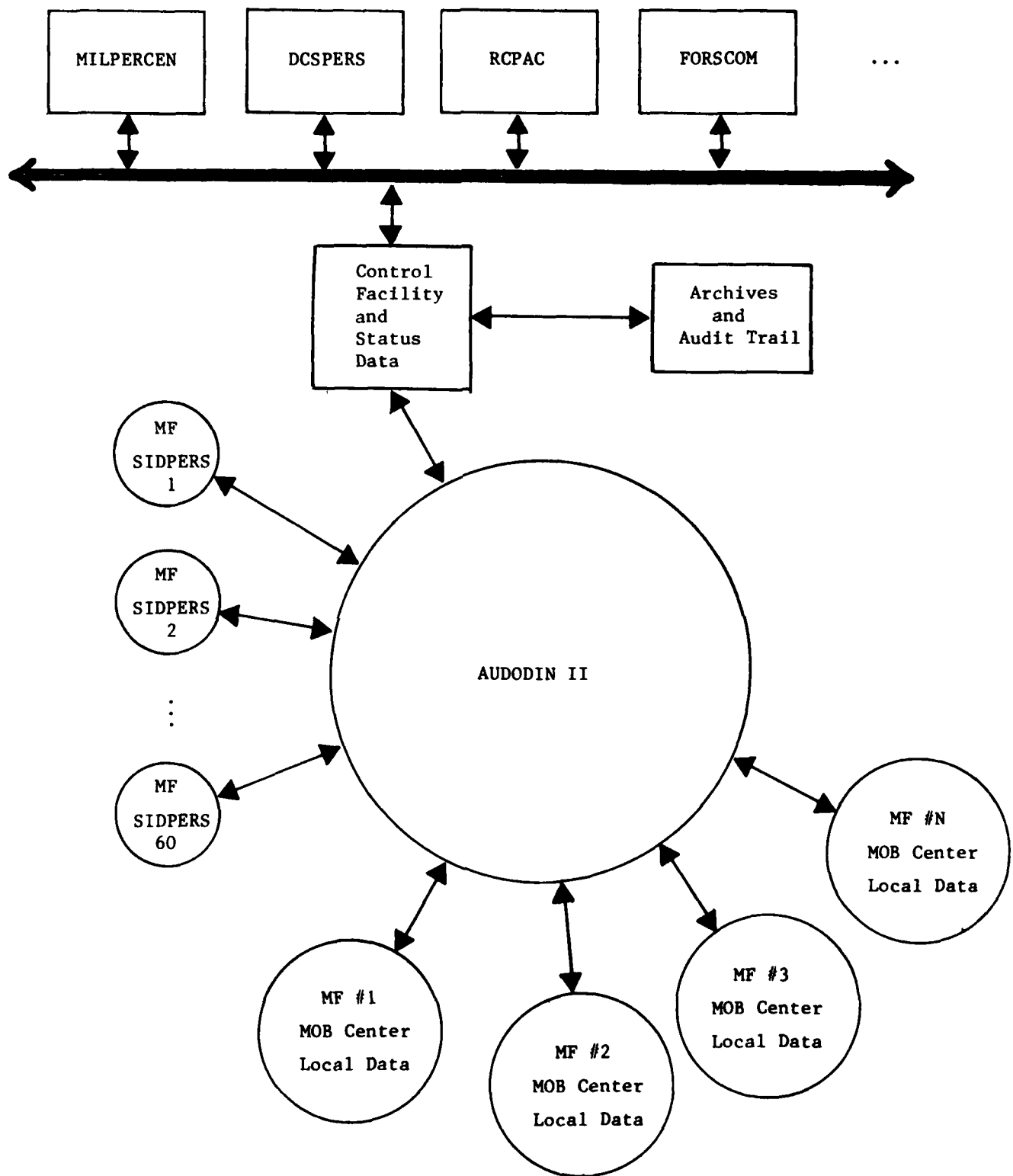
FIGURE 2

MILPERCEN

DCSPERS

RCPAC

Other
Army
Commands

AUTODIN II

Central
Facility
for all
HRI Data

SIDPERS
Installations

MF #1
MOB
Center

MF #2
MOB
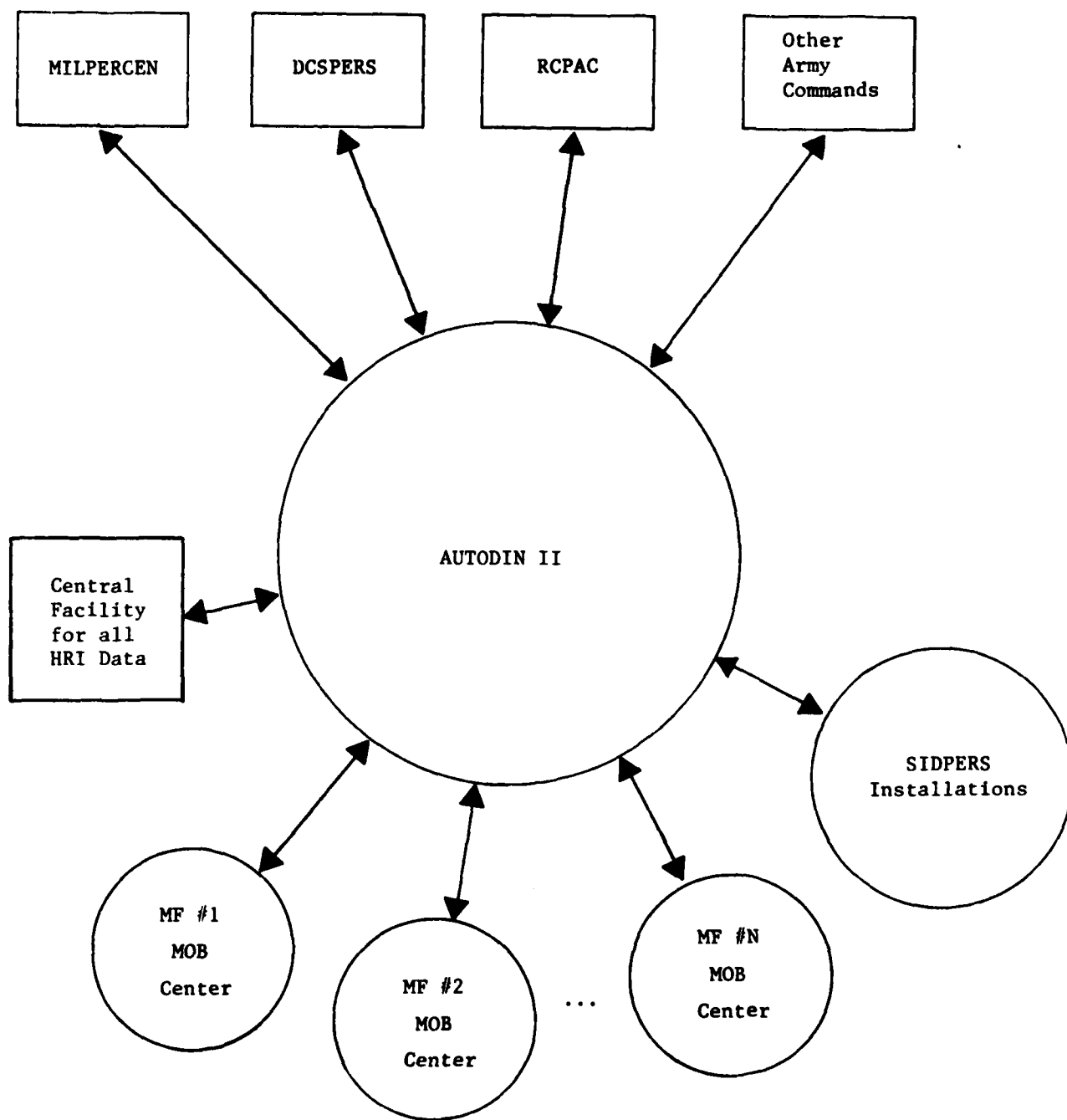Center

...

MF #N
MOB
Center

FIGURE 3

to his assigned mobilization center. When he appears at an alternate
center, the control center should be able to locate and move his records
to the location at which he has appeared. The central control site
would have knowledge of all troop movements and would synchronize all
record movements, etc.

Figure 3 illustrates how a completely centralized data and control
system might work. For the case of the reservist reporting to a
mobilization center other than the one assigned him, it would only be
necessary to modify his location indicator rather than move his record.
All troop movements would still be managed on a central control basis.

An interesting alternative to figure 3 would be a system in which
the central facility is actually a network of computers wherein a given
computer and data base act like a distributed processing center
dedicated to a specific military facility or mobilization center. The
same controls, record movements, etc. would take place within a local
network rather than a network of remotely located centers.

The viability of such conceptual systems is clear. But how does
one choose among them? A responsible decision maker has many questions
which cannot be answered with respect to tradeoffs, benefits, etc.
Decision support data is needed. Military planning and implementation
operate in a complex bureaucratic milieu which demands that choices be
supported by data. The House Government Operations Committee, the House
Appropriations Committee, the General Services Administration, the
Office of Management and Budget, the General Accounting Office and a
myriad of Defense organizations have to be convinced with data and
appropriate audit trails that choices which result in multi-million dol-
lar procurements have been based on good data and that such complex
systems have a high probability of success. This kind of data simply
does not exist. This calls for a research effort to produce and
evaluate such data. Such a research program can be outlined as follows:

> Given that the (active/inactive) OMF/EMF files are to be
> integrated and have been specified, identify what additional
> data would be required to integrate RCPAC records with those
> of MILPERCEN:
>
>> (a.) Investigate and identify transformation
>> procedures which would permit these files to be
>> integrated. Obviously, some troops on active duty
>> have records in RCPAC; some troops on reserve duty
>> have records archived in MILPERCEN; some troops have
>> achieved reserve status without an active Army
>> record, etc.
>>
>> (b.) Given the structure and quantity of these data,
>> develop a set of records (without violation of
>> privacy, individual rights, etc.) which truly
>> characterize the Army HRIDB as it now stands. (As
>> used here, a data base is a simple collection of
>> records possessing attributes.)

(c.) From the set of standard DBMS's commercially available, identify those that accommodate the quantity of data involved. If none exist, investigate the modifications needed for those which provide the closest fit.

(d.) Select the DBMS which supports the activities which follow and build the data base needed to support the research to be performed.

(e.) Characterize the Army which will exist after mobilization. For instance, the set of active records of troops with less than six months service might well profile (demographically and otherwise) the troops to be accessioned via the draft. Build a set of records of sterotypes of the size needed for actually simulating the data handling requirements of a mobilized Army.

(g.) Select the DBMS best suited for performing analysis on such a body of records.

(h.). From the fifty or so SIDPERS facilities, identify those which could best serve as mobilization centers. From the set of sterotype records, identify the set of records to be maintained at each mobilization center under a distributed data model.

(i.) Take the largest of these distributed sets of data and identify the set of DBMS's which can accommodate this amount of data.

(j.) Take the total HRIDB and identify the set of DBMS's which can accommodate this amount of data.

(k.) Identify the structural constraints imposed by each of the DBMS's for each of the sets of data in (i.) and (j.) above.

(l.) Install the data bases of (i.) and (j.) under the constraints of (k.) on a single computer of appropriate capacity for each case.

(m.) Generate a "Standard Typical" set of query/update scenarios and run these against each system and data base. Measure response as a function of load.

(n.) Rank each DBMS with respect to flexibility, maintainabilty, responsiveness, etc.

(o.) Select the DBMS best suited to the HRIDB.

(p.) Develop simulation scenarios wherein the total

central HRIDB resident on one computer or tightly coupled set of computers is simulated by a computer dedicated to creating a mobilization simulation. The stimulator would also record and report response data, errors, etc.

(q.) Identify and install on the necessary number of mobilization center computers, the appropriate segment of the HRIDB. From this distribution identify the set of "control data" needed to manage a distributed data system with central knowledge of the content of each mobilization center. This will of course require a complete network of computers. Using such a network, simulate a mobilization exercise.

(r.) Throughout the above activities identify and report data and trends which may be important to decision makers responsible for maintaining human resource information for the Army.

This list of proposed research activities illustrates the scope and nature of the work needed to be done in a research atmosphere independent of operational necessities. A major problem faced by the Army now is that operational units are being asked to make decisions and commitments in the absence of much needed data. Each of the tasks outlined above is such a significant effort that a commitment at the DCSPERS level *to support research of this sort is* needed in order to generate data that will support planning throughout the human resource community. The kind of data and experience called for in the above list of tasks simply will not come from the private sector.

The following summary of recommendations is consistent with the findings of the Georgia Tech research team and with the workshop findings as summarized in the "proposed solution" extended to provide a mechanism for generating decision support data through the recommended research program in order to sustain the planning and implementation processes of the Army.

SUMMARY OF RECOMMENDATIONS

In summary, we recommend that DCSPERS employ a planning framework
which embodies the following:

GOALS

* Eliminate the obsolescence of the Army's "automated" per-
sonnel systems.

* Establish and enforce human resource information policies
which eliminate the fragmentation of personnel data for
whatever purpose: peacetime, wartime, etc.

DEVELOPMENT PLAN

* Establish a continuing program of HRIDB research which
will support decision makers who must contend with the
intricacies of government management (particularly computer
procurements).

* Establish a management strategy based on current
knowledge.   Anticipate that current knowledge will   be
altered by HRIDB research results:

> - develop functional specifications based on
> current perception of an integrated personnel data
> management system such as has been described in
> general terms in this section.

> - develop a schedule of events leading toward the
> goal of eliminating obsolescence; for instance,
> first eliminate hardware obsolescence, move from
> batch processing   to on-line data acquisition
> control and reporting, etc. This will involve per-
> sonnel development, training, etc.

> - Initiate and sustain whatever organizational
> changes are needed to comply with a policy which
> eliminates the fragmentation of the Army's human
> resource information data.

* Develop a program of education and public relations within
the Army which supports this development plan.

These recommendations are consistent with the findings of the Geor-
gia Tech research team and with the workshop findings as summarized in
the "proposed solution"; but they extend these findings and the solution
proposed therein by providing a mechanism for generating decision sup-
port data through the recommended research program in order to sustain
the planning and implementation processes of the Army.

DATE
ILMED

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